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L9: Entry 280 of 299 File: USPT Sep 5, 1989

DOCUMENT-IDENTIFIER: US 4863753 A
TITLE: Reduced calorie peanut butter

Abstract Text (1):
The present invention relates to a reduced calorie peanut butter wherein the oil phase comprises triglycerides containing at least about 10% by weight medium chain fatty acids. Preferably, medium chain triglycerides are used in the oil phase. It has been found that use of these triglycerides allows the desired peanut butter consistency to be maintained at lower levels of total oil.

Brief Summary Text (2):
This invention relates to peanut butters. More particularly, the invention relates to a reduced calorie peanut butter in which the oil phase contains triglycerides esterified with medium chain fatty acids.

Brief Summary Text (7):
Additionally, U.S. Pat. No. 3,865,939 of Jandacek, issued Feb. 11, 1975, discloses a hypercholesterolemic oil suitable for use in peanut butter comprising a liquid glyceride base oil, 2.0-6.9% of a plant sterol, and a solubilizing agent for the sterol. The base oil can comprise triglycerides in which one or more short chain fatty acids, such as acetic or propanoic acid, replace in part the long chain fatty acids present in natural triglyceride oils.

Brief Summary Text (10):
Medium chain triglycerides (MCT's) are known to the art for use as a substitute for typical triglyceride fats. MCT's are triglycerides esterified with saturated C.sub.6 to C.sub.12 fatty acids. These medium chain triglycerides are metabolized differently from long chain triglycerides by the body because they are more water-soluble. In addition, they hydrolyze rapidly and are absorbed via the portal vein, providing a source of quick energy. A discussion of medium chain triglycerides is provided by Bach et al., "Medium-Chain Triglycerides: an Update," The American Journal of Clinical Nutrition 36, Nov. 1982, pp. 950-962.

Brief Summary Text (13):
It is another object of the present invention to provide a reduced calorie peanut butter in which the calorie reduction is achieved by the replacement of at least a portion of the peanut oil with triglycerides containing medium chain fatty acids.

Brief Summary Text (18):
The invention is a peanut butter comprising a dispersion of finely divided peanut particles in a continuous oil phase, wherein the oil phase comprises triglycerides containing at least about 10% by weight medium chain fatty acids. Preferred triglycerides for use in the invention are medium chain triglycerides. The peanut butter is reduced in calories while maintaining an excellent consistency.

Brief Summary Text (20):
The present invention relates to a reduced calorie peanut butter in which at least a portion of the peanut oil is replaced by triglycerides containing medium chain fatty acids. Preferably, medium chain triglycerides are used. It has been surprisingly discovered that these triglycerides have a greater effect on peanut butter consistency than the peanut oil they replace. Accordingly, a lower oil

replacement level can be used without sacrificing the excellent consistency of the peanut butter. Moreover, the addition of medium chain triglycerides to the peanut butter is advantageous because MCT's are reduced in calories and they are digested like carbohydrates to provide a source of quick energy. The combination of the lower level of total oil and the use of MCT's results in a peanut butter that is lower in calories and proportionately higher in protein than regular peanut butters, while maintaining the desired peanut butter consistency.

Brief Summary Text (21):
Specifically, the present invention is a peanut butter comprising a dispersion of finely divided peanut particles in a continuous oil phase, wherein the oil phase comprises triglycerides containing at least about 10% by weight medium chain fatty acids. Preferably, the peanut butter comprises from about 20% to about 70% by weight continuous oil phase and from about 30% to about to about 80% by weight peanut particles, and more preferably from about 30% to about 60% oil phase and from about 40% to about 70% peanut particles. Under the peanut butter definition and standards of quality, Federal Register 29, 15, 173-174, No. 220 (1964), the total oil content of peanut butter may not exceed 55%. Therefore, the most preferred peanut butter of the present invention comprises from about 35% to about 55% by weight continuous oil phase and from about 45% to about 65% by weight peanut particles. However, it is not intended to limit the broad scope of this invention to compositions within the standards of identity; the invention can include peanut "spreads" as well as peanut butter. In addition, it is preferred that the weight ratio of continuous oil phase to peanut particles be from about 40:60 to about 50:50, preferably about 45:55.

Brief Summary Text (22):
Triglycerides Containing Medium Chain Fatty Acids

Brief Summary Text (23):
As discussed hereinabove, the oil phase of the present peanut butter comprises triglycerides containing at least about 10% by weight medium chain fatty acids.

Brief Summary Text (24):
By "medium chain fatty acids," as used herein, is meant caproic acid (C.sub.6:0), caprylic acid (C.sub.8:0), and capric acid (C.sub.10:0). In this listing of fatty acid moieties, the common name of the fatty acid is given followed by its C.sub.x:y designation, wherein x is the number of carbon atoms and y is the number of double bonds.

Brief Summary Text (25):
Preferably, the triglycerides contain at least about 30% by weight medium chain fatty acids, more preferably at least about 50%, more preferably at least about 70%, and most preferably at least about 90% by weight medium chain fatty acids.

Brief Summary Text (26):
The weight percentage of medium chain fatty acids is calculated as a percentage of the total fatty acids from all the triglyceride sources in the oil phase. For example, where the oil phase consists of 93% medium chain triglycerides, 5% rapeseed hardstock (stabilizer) and 2% peanut oil, the total fatty acids are determined by adding the fatty acids from the medium chain triglycerides, hardstock and peanut oil. The method for measuring fatty acid composition is described below in the Analytical Methods section.

Brief Summary Text (27):
The triglycerides containing medium chain fatty acids can be incorporated into the present peanut butter by any method. A potential method is by the use of peanuts that have been genetically engineered to alter the natural peanut oil fatty acid composition. (Peanut oil is high in oleic, linoleic and palmitic acids and it does not contain medium chain fatty acids.)

Brief Summary Text (28):
However, the preferred method for introducing medium chain fatty acids is to remove peanut oil from the peanut paste and replace it with triglycerides containing medium chain fatty acids. Most preferably, these triglycerides are "medium chain triglycerides".

Brief Summary Text (29):
Medium chain triglycerides (MCT's) are triglycerides esterified with saturated C.sub.6 to C.sub.12 fatty acids, predominantly C.sub.8 and C.sub.10. These shorter chain triglycerides are metabolized differently by the body because they are more water-soluble than long chain triglycerides. Long chain triglycerides are hydrolyzed into long chain fatty acids and monoglycerides, absorbed, reesterified, incorporated into chylomicron structures, and transported into the lymph. In contrast, MCT's are rapidly hydrolyzed to medium chain fatty acids which are then absorbed into the portal vein and oxidized by the liver. As a result, the body tends to treat the energy from MCT's similarly to the energy from carbohydrates. MCT's contain at least about 10% fewer calories than most triglycerides found in vegetable oils and animal fats as determined by bomb calorimetry. Additionally, because the body is inefficient in converting MCT's to body fat, the metabolizable or net calories that MCT's provide are actually lower than the 10% reduction predicted by conventional measurements. Therefore, it is highly desirable to include MCT's as the oil component in a peanut butter product.

Brief Summary Text (30):
Specifically, MCT's are triglycerides in which the glycerol group is completely esterified with one or more of the following fatty acids: C.sub.6:0 (caproic), C.sub.8:0 (caprylic), C.sub.10:0 (capric), and C.sub.12:0 (lauric). The lauric acid is generally present in amounts of about 2% or less. A typical MCT fatty acid composition is about 2-4% C.sub.6:0, about 50-75% C.sub.8:0, about 25-43% C.sub.10:0, and about 0.5-2% C.sub.12:0.

Brief Summary Text (31):
For purposes of the present invention, by "medium chain triglycerides" is meant triglycerides completely esterified with fatty acids selected from the group consisting of caproic, caprylic, capric, lauric, and mixtures thereof, where the level of lauric acid is not more than about 5%, preferably not more than about 2%. Preferably the medium chain triglycerides have the following fatty acid composition: from about 0% to about 15% C.sub.6:0, from about 40% to about 85% C.sub.8:0, from about 15% to about 55% C.sub.10:0, and from about 0% to about 5% C.sub.12:0.

Brief Summary Text (32):
Preferably, at least about 12% by weight of the triglycerides in the continuous oil phase are medium chain triglycerides, more preferably at least about 35%, more preferably at least about 60%, more preferably at least about 75%, more preferably at least about 90%, more preferably at least about 96%, and most preferably about 100%.

Brief Summary Text (33):
A more detailed discussion on medium chain triglycerides is found in the following references: Bach et al., "Medium-Chain Triglycerides: an Update," The American Journal of Clinical Nutrition 36, November 1982, pp. 950-962; and Senior, Medium Chain Triglycerides. University of Pennsylvania Press, Philadelphia, PA (1968), both incorporated by reference herein.

Brief Summary Text (34):
Fatty Acids Other Than Medium Chain Fatty Acids

Brief Summary Text (35):

Besides medium chain fatty acids, the present triglycerides can be esterified with any of the fatty acids typical of fats and oils. In a preferred embodiment of the invention, however, the remaining fatty acids are long chain fatty acids.

Brief Summary Text (36):
By "long chain fatty acids," as used herein, is meant saturated or unsaturated C.sub.17 to C.sub.26 fatty acids: C.sub.17:0 (margaric), C.sub.18:0 (stearic), C.sub.18 1 (oleic or ricinoleic), C.sub.18:2 (linoleic), C.sub.18:3 (linolenic, licanic or eleostearic), C.sub.18:4 (octadecatetraenoic), C.sub.19:0 (nonadecanoic), C.sub.20:0 (arachidic), C.sub.20:1 (eicosenoic), C.sub.20:2 (eicosadienoic), C.sub.20:4 (arachidonic), C.sub.20:5 (eicosapentaenoic), C.sub.21:0 (heneicosanoic), C.sub.22 (behenic), C.sub.22:1 (erucic), C.sub.22:2.5 (docosapolyenoic), C.sub.23:0 (tricosanoic), C.sub.24:0 (tetracosanoic), C.sub.24:6 (nisinic), C.sub.25:0 (pentacosanoic), C.sub.26:0 (certoic), and C.sub.26:5 (shibic).

Brief Summary Text (37):
Polymorphic stability of the triglycerides in a peanut butter product is best achieved by using predominantly unsaturated rather than saturated long chain fatty acids. If they contain too many long chain saturated fatty acids, the crystal structure of these triglycerides can change from beta prime to beta in a peanut butter after several weeks of storage, causing an undesirable hardening of the peanut butter.

Brief Summary Text (38):
Therefore, the present triglycerides esterified with combinations of medium chain and long chain fatty acids preferably have the following fatty acid composition by weight percent:

Brief Summary Text (39):
(a) from about 15% to about 70% saturated C.sub.6 to C.sub.10 fatty acids;

Brief Summary Text (40):
(b) from about 10% to about 65% unsaturated C.sub.17 to C.sub.26 fatty acids;

Brief Summary Text (41):
(c) from about 0% to about 20% saturated C.sub.17 to C.sub.26 fatty acids; and

Brief Summary Text (42):
(d) from about 0% to about 10% fatty acids selected from the group consisting of saturated C.sub.12 to C16 fatty acids and unsaturated C.sub.12 to C.sub.16 fatty acids, and mixtures thereof.

Brief Summary Text (43):
For optimum polymorphic stability, the ratio of saturated to unsaturated C.sub.17 to C.sub.26 fatty acids is preferably not more than about 1:3, and most preferably not more than about 1:4.

Brief Summary Text (44):
From a nutritional standpoint, it is preferred that the present peanut butter contain from about 5% to about 25% linoleic acid (C.sub.18:2) and up to about 15% linolenic acid (C.sub.18 3). These essential fatty acids can be introduced either as part of the triglycerides containing combinations of medium chain and long chain fatty acids, or from another triglyceride source in the peanut butter (e.g., peanut oil is high in C.sub.18:2).

Brief Summary Text (45):
For a peanut butter product that is used shortly after manufacture, polymorphic instability is not a problem. Therefore, the triglycerides esterified with combinations of medium chain and long chain fatty acids can also contain a large

percentage of saturated long chain fatty acids. The use of saturated long chain fatty acids provides additional calorie reduction benefits, because they are only partially absorbed by the body. These triglycerides have the following fatty acid composition by weight percent:

Brief Summary Text (46):
(a) from about 15% to about 70% saturated C.sub.6 to C.sub.10 fatty acids;

Brief Summary Text (47):
(b) from about 0% to about 20% unsaturated C.sub.17 to C.sub.26 fatty acids;

Brief Summary Text (48):
(c) from about 3% to about 65% saturated C.sub.17 to C.sub.26 fatty acids; and

Brief Summary Text (49):
(d) from about 0% to about 10% fatty acids selected from the group consisting of saturated C.sub.12 to C.sub.16 fatty

Brief Summary Text (50):
acids and unsaturated C.sub.12 to C.sub.16 fatty acids, and mixtures thereof.

Brief Summary Text (51):
The triglycerides esterified with combinations of medium chain and long chain fatty acids can be prepared by a wide variety of techniques such as:

Brief Summary Text (52):
(a) random rearrangement of long chain triglycerides and medium chain triglycerides;

Brief Summary Text (53):
(b) esterification of glycerol with a blend of the corresponding fatty acids; and

Brief Summary Text (54):
(c) transesterification of a blend of medium and long chain fatty acid methyl esters with glycerol.

Brief Summary Text (55):
Random rearrangement of triglycerides is well-known in the art, as is the esterification of glycerol with fatty acids. For discussions on these subjects, see Hamilton et al., Fats and Oils: Chemistry and Technology. pp. 93-96, Applied Science Publishers Ltd., London (1980), and Swern, Bailey's Industrial Oil and Fat Products. 3d ed., pp. 941-943 and 958-965 (1964), both disclosures incorporated by reference herein. Transesterification is also discussed generally in Bailey's at pp. 958-963.

Brief Summary Text (56):
Fatty acids per se or naturally occurring fats and oils can serve as the source for the fatty acid component of the triglycerides of the present invention. For example, linoleic acid (C.sub.18:2) is a major component of safflowerseed oil, sunflowerseed oil, cottonseed oil, corn oil and soybean oil. Linolenic acid (C.sub.18:3) is found in linseed oil and perilla oil. Rapeseed oil provides a good source for behenic acid (C.sub.22:0). Medium chain fatty acids can be obtained from coconut, palm kernel, or babassu oils, or they can be obtained from medium chain triglycerides. Commercial medium chain triglycerides are sold by Capital City Products, Dept. TR, P.O. Box 569, Columbus, OH 43216, under the brand names Captex 200, 300 and 355.

Brief Summary Text (57):
The continuous oil phase of the present peanut butter comprises triglycerides containing at least about 10% medium chain fatty acids as described hereinabove.

However, it is not necessary that all the triglycerides in the oil phase contain medium chain fatty acids, as long as the triglycerides as a whole contain at least about 10% medium chain fatty acids. For example, it is difficult to completely remove peanut oil from peanut paste; therefore, the oil phase generally contains about 2% or more peanut oil. If desired, other animal or vegetable fats or oils can be added to the oil phase provided they do not interfere with the desirable consistency and organoleptic properties of the peanut butter. As discussed below, the peanut butter generally contains up to about 5% of a stabilizer consisting of a fully or partially hydrogenated triglyceride such as rapeseed oil. Some unhydrogenated or slightly hydrogenated triglyceride oils can also be added if desired.

Brief Summary Text (58):
Various fat substitutes can also be used in the oil phase of the present peanut butter provided they do not adversely affect the textural benefit of the invention. Examples of such materials are: fatty alcohol esters of polycarboxylic acids (U.S. Pat. No. 4,508,746 to Hamm, assigned to CPC International, Inc., issued April 2, 1985); fatty polyethers of polyglycerol (U.S. Pat. No. 3,932,532 of Hunter et al., assigned to ICI United States, Inc., issued January 13, 1976) (food use disclosed in German Pat. No. 207,070, issued February 15, 1984)); ethers and ether-esters of polyols containing the neopentyl moiety (U.S. Pat. No. 2,962,419 of Minich, issued Nov. 29, 1960); fatty alcohol diesters of dicarboxylic acids such as malonic and succinic acid (U.S. Pat. No. 4,582,927 of Fulcher, assigned to Frito-Lay, Inc., issued April 15, 1986); triglyceride esters of alpha branched chain-alkyl carboxylic acids (U.S. Pat. No. 3579,548 of Whyte, assigned to The Procter & Gamble Co., issued May 18, 1971); N-Oil; jojoba oil; and sugar and sugar alcohol fatty acid polyesters (U.S. Pat. No. 3,600,186 of Mattson and Volpenhein, assigned to Procter & Gamble, issued August 17, 1971), all incorporated herein by reference.

Brief Summary Text (60):
The present peanut butter is comprised of peanut paste, stabilizer, and optionally other ingredients such as emulsifier, sweetener, and salt. The peanut butter comprises from about 75% to about 99% by weight peanut paste. This ingredient is ordinarily obtained by conventional methods of roasting and blanching raw peanuts and then grinding them. The resulting peanut paste is a mixture of peanut particles and oil which have been released from the cellular structure of the nuts during the grinding operation. At least a portion of the oil is replaced by triglycerides containing medium chain fatty acids, as discussed hereinabove. Methods for replacing the peanut oil are discussed in detail below.

Brief Summary Text (65):
Although the present invention is not limited by the processing method, typically peanuts having been roasted and blanched are ground to a particle size found in conventional peanut paste. The paste is then processed to remove a portion of the peanut oil and replace it with triglycerides containing medium chain fatty acids. Then the other peanut butter ingredients are added to provide a homogeneous mixture. It is preferred that the processing stream be maintained in an inert atmosphere, e.g. a nitrogen atmosphere, starting just before the grinding step and continuing throughout the remainder of the process. The homogeneous mixture with its stabilizer components in molten state is subjected to processing to properly crystallize the stabilizer. Ordinarily the stabilizer is in molten state when the homogeneous mixture is at a temperature greater than 100.degree. F. (38.degree. C.). The crystallization is carried out by cooling the homogeneous mixture from this temperature, for example, in a scraped wall heat exchanger and then subjecting the mixture to agitation, for example, in a picker. After being processed through the picker the product is ordinarily introduced into containers by a filler, then tempered.

Brief Summary Text (69):
As discussed hereinabove, the present peanut butter can contain a lower level of

total oil while maintaining an excellent consistency. For example, when medium chain triglycerides are used to replace peanut oil in the present invention, a 96% replacement of peanut oil by MCT's allows about a 2% reduction in total oil while maintaining the same consistency.

Brief Summary Text (72):
There are various methods of replacing the peanut oil found in peanut butter paste with triglycerides containing medium chain fatty acids, and the invention is not limited by the method. The peanut oil is first extracted from the paste, usually by physical and/or solvent processes.

Brief Summary Text (78):
After extraction of the peanut oil from the paste, triglycerides containing medium chain fatty acids are added to the paste. For example, for a small peanut butter sample, 198 grams of peanut paste containing 3% peanut oil is mixed with 117 grams of medium chain triglycerides. These ingredients are blended together using a two-quart Hobart bowl and mixer. The ingredients are mixed one minute at speed #1, then three minutes at speed #3. The sample is then placed into a hot water bath and heated to 165.degree. F. (74.degree. C.). Lastly, the sample is stored at -10.degree. F. (-23.degree. C.) for 16 hours to initiate crystallization, then tempered at 80.degree. F. (27.degree. C.) for a minimum of 24 hours, then stored at 70.degree. F. (21.degree. C.).

Brief Summary Text (80):
I. Fatty Acid Composition

Brief Summary Text (82):
The fatty acid composition of the triglycerides of the present invention is measured by gas chromatography. First, fatty acid methyl esters of the triglycerides are prepared by any standard method (e.g., by transesterification using sodium methoxide), and then separated on a capillary column which is coated with DB-WAX stationary phase. The fatty acid methyl esters are separated by chain length and degree of unsaturation. A split injection is made with flame ionization detection. Quantitation is performed by use of a double internal standard method. This method can separate fatty acid methyl esters from C.sub.6 to C.sub.24.

Brief Summary Text (84):
Two reference standards are used each day of operation to verify proper operation of this method. 1) A reference mixture of fatty acid methyl esters (FAME) is used to check the operation of the instrument. This reference mixture has the following fatty acid composition: 1% C.sub.14.0, 4% C.sub.16:0, 3% C.sub.18:0, 45% C.sub.18:1, 15% C.sub.18:2, 3% C.sub.18:3, 3% C.sub.20:0, 3% C.sub.22:0, 20% C.sub.22:1, and 3% C.sub.24:0. A reference standard of a commercial shortening is used to check the operation of the total system--methylation and gas chromatographic analysis. The shortening reference standard has the following fatty acid composition: 0.4% C.sub.14:0, 21.4% C.sub.16:0, 9.2% C.sub.18:0, 40.3% C.sub.18:1, 23.0% C.sub.18:2, 2.2% C.sub.18:3, 0.4% C.sub.20:0, 1.3% C.sub.20:1, and 0.3% C.sub.22:0.

Brief Summary Text (93):
2. Prepare the triglyceride samples to be analyzed by adding two internal standards, C9 and C21 triglycerides. (C9 and C21 triglycerides are commercial standards consisting of triglycerides esterified with 100% 9-carbon and 21-carbon fatty acids, respectively.) The internal standards are added to the samples at 10% by weight of the sample. The samples (including the internal standards) are then converted to methyl esters by transesterification using sodium methoxide or another standard method.

Brief Summary Text (96):
5. The data is analyzed with two internal standard procedures. The absolute amount

(mg of esters per gram of sample) of the C.sub.6 through C16 components is calculated from the C9 internal standard. The absolute amount of the C18, C20, C22 and C24 components is calculated from the C21 internal standard. Weight percentages of fatty acids are calculated from these amounts.

Detailed Description Text (3):
A peanut butter is prepared as described below. The defatted peanut paste has been multiple solvent extracted with hexane to remove all but 2.61% of the peanut oil. The medium chain triglycerides (MCT's) have the following fatty acid composition: 2.9% C.sub.6:0, 68.6% C.sub.8:0, 27.9% C.sub.10:0 and 0.6% C.sub.12:0 (Captex 300, Capital City Products). The peanut butter has the following composition:

Detailed Description Text (6):
Peanut butter compositions are prepared with varying ratios of medium chain triglycerides and peanut oil. The medium chain triglycerides (MCT's) and defatted peanut paste are the same as in Example 1.

Detailed Description Text (17):
A peanut butter is prepared as in Example 1, except that triglycerides containing combinations of medium and long-chain fatty acids are used instead of MCT'S. The tailored medium chain triglycerides have the following approximate fatty acid composition: 1.5% C.sub.6:0, 36.4% C.sub.8:0, 14.8% C.sub.10:0, 0.3% C.sub.12:0, 3.5% C.sub.18:0, 3.5% C.sub.20:0, 38.7% C.sub.22:0, and 1.3% C.sub.24:0. The peanut paste has been hydraulic pressed but not solvent extracted. The ingredients are combined in the following percentages:

Detailed Description Text (18):
The peanut butter product has an excellent consistency when fresh, but it stiffens after two weeks of storage. The same peanut butter made with triglycerides containing long chain unsaturated instead of saturated fatty acids retains its excellent consistency after prolonged storage.

Other Reference Publication (2):
Senior, Medium Chain Triglycerides, Univ. of Pennsylvania Press, pp. 283, 285, 1968.

Other Reference Publication (3):
Bach et al., "Medium Chain Triglycerides: An Update", The American Journal of Clinical Nutrition, 36, pp. 950-962.

Other Reference Publication (4):
Worthington et al., "Variability in Fatty Acid Composition Among Arachis Genotypes: A Potential Source of Product Improvement", JAOCS 54 (2), pp. 105A-108A (Abstract).

Other Reference Publication (6):
Maiz et al., "Protein Metabolism During Total Parenteral Nutrition (TPN) in Injured Rats Using Medium Chain Triglycerides", Metabolism, vol. 33, No. 10, pp. 901-909.

CLAIMS:

1. A peanut butter comprising a dispersion of finely divided peanut particles in a continuous oil phase, wherein the oil phase comprises triglycerides containing at least about 30% medium chain fatty acids.

2. A peanut butter according to claim 1 wherein the triglycerides contain at least about 50% medium chain fatty acids.

3. A peanut butter according to claim 2 wherein the triglycerides contain at least about 70% medium chain fatty acids.

11. A peanut butter according to claim 1 wherein at least about 12% by weight of said triglycerides are medium chain triglycerides.

12. A peanut butter comprising a dispersion of finely divided peanut particles in a continuous oil phase, wherein the oil phase comprises triglycerides containing at least about 10% medium chain fatty acids, and wherein at least about 35% of said triglycerides are medium chain triglycerides.

13. A peanut butter according to claim 12 wherein at least about 60% of said triglycerides are medium chain triglycerides.

14. A peanut butter according to claim 13 wherein at least about 90% of said triglycerides are medium chain triglycerides.

15. A peanut butter according to claim 14 wherein about 100% of said triglycerides are medium chain triglycerides.

16. A peanut butter according to claim 12 wherein the medium chain triglycerides have the following fatty acid composition by weight percent: from about 0% to about 15% C.sub.6:0, from about 40% to about 85% C.sub.8:0, from about 15% to about 55% C.sub.10:0, and from about 0% to about 5% C.sub.12:0.

17. A peanut butter according to claim 1 wherein said triglycerides have the following fatty acid composition by weight percent:

(a) from about 15% to about 70% saturated C.sub.6 to C.sub.10 fatty acids;

(b) from about 10% to about 65% unsaturated C.sub.17 to C.sub.26 fatty acids;

(c) from about 0% to about 20% saturated C.sub.17 to C.sub.26 fatty acids; and

(d) from about 0% to about 10% fatty acids selected from the group consisting of saturated C.sub.12 to C.sub.16 fatty acids and unsaturated C.sub.12 to C.sub.16 fatty acids, and mixtures thereof.

18. A peanut butter according to claim 1 wherein said triglycerides have the following fatty acid composition by weight percent:

(a) from about 15% to about 70% saturated C.sub.6 to C.sub.10 fatty acids;

(b) from about 0% to about 20% unsaturated C.sub.17 to C.sub.26 fatty acids;

(c) from about 3% to about 65% saturated C.sub.17 to C.sub.26 fatty acids; and

(d) from about 0% to about 10% fatty acids selected from the group consisting of saturated C.sub.12 to C.sub.16 fatty acids and unsaturated C.sub.12 to C.sub.16 fatty acids, and mixtures thereof.

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Search Results - Record(s) 11 through 20 of 26 returned.

☐ 11. 5589216. 08 Nov 94; 31 Dec 96. Reduced calorie confectionery compositions which contain reduced calorie fats which exhibit rapid transformation to beta phase. Guskey; Gerald J., et al. 426/607; 426/613 426/660. A23G001/00.

☐ 12. 5492714. 08 Nov 94; 20 Feb 96. Reduced calorie fats which comprise reduced calorie triglycerides containing medium and long chain fatty acids and which exhibit rapid crystallization to beta phase. Guskey; Gerald J., et al. 426/607; 426/804. A23D009/00.

☐ 13. 5419925. 11 Apr 94; 30 May 95. Reduced calorie fat compositions containing polyol polyesters and reduced calorie triglycerides. Seiden; Paul, et al. 426/611; 426/804. A23D007/005.

☐ 14. 5354573. 02 Apr 93; 11 Oct 94. Fat soluble polymers and their use in foods. Gross; Akiva T., et al. 426/603; 106/244 426/417 426/601 426/602 523/511 524/322. A23D007/00 A23D009/00.

☐ 15. 5288512. 04 Dec 92; 22 Feb 94. Reduced calorie fats made from triglycerides containing medium and long chain fatty acids. Seiden; Paul. 426/607; 426/549 426/660 426/804. A23D005/00.

☐ 16. 5275835. 29 Sep 92; 04 Jan 94. Process for preparing reduced calorie flavored confectionery compositions using dynamic tempering conditions. Masterson; Daniel J., et al. 426/607; 426/613 426/660 426/804. A23G001/00.

☐ 17. 5142072. 19 Dec 89; 25 Aug 92. Selective esterification of long chain fatty acid monoglycerides with medium chain fatty acid anhydrides. Stipp; Gordon K., et al. 554/172;. C11C003/08.

☐ 18. 5142071. 19 Dec 89; 25 Aug 92. Selective esterification of long chain fatty acid monoglycerides with medium chain fatty acids. Kluesener; Bernard W., et al. 554/172;. C11C003/08.

☐ 19. 5120563. 18 Sep 91; 09 Jun 92. Food compositions containing reduced calorie fats and reduced calorie sugars. Mohlenkamp, Jr.; Marvin J., et al. 426/601; 426/603 426/607 426/658 536/123.1 536/123.13. A23D009/00.

☐ 20. 5104587. 16 May 90; 14 Apr 92. Countercurrent liquid/liquid extraction to fractionate complex mixtures containing medium and long chain fatty acid triglycerides. Besserman; Mark A., et al. 554/175; 554/206 554/207. C11B003/00.

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Terms	Documents
L2 and (edible or (plant adj oil) or peanut or soybean or cotton or seed or corn or whale)	26

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L4: Entry 26 of 26 File: USPT Dec 19, 1989

DOCUMENT-IDENTIFIER: US 4888196 A
TITLE: Process for tempering flavored confectionery compositions containing reduced calorie fats and resulting tempered products

Brief Summary Text (57):
The major constituent in this fat component is a reduced calorie fat. By "reduced calorie fat" as used herein is meant fats that provide an at least about 10%, and preferably an at least about 30%, reduction in calories relative to corn oil. These reduced calorie fats usually provide between about 20% and about 50% reduction in calories. The reduction in calories provided by these reduced calorie fats is based on the net energy gain (in Kcal) of rats that have ingested a diet containing the reduced calorie fat, relative to the net energy gain (in Kcal) of rats that have ingested an identical diet, but containing corn oil instead of the reduced calorie fat. The test diets used are nutritionally adequate to support both maintenance and growth of the rats. Total food intake and fat/oil intake are also matched between the two diet groups so that differences in net carcass energy gain are due entirely to the utilizable energy content of the fat/oil. ("Net energy gain" is based on the total carcass energy (in Kcal) of the rats fed the test diet for some period of time (usually 4 weeks), reduced by the mean starting carcass energy (in Kcal) determined from a study of a different group of rats of the same sex, strain, and similar body weight fed a test diet that does not contain the fat/oil. "Total carcass energy" is determined by the dry carcass energy program (Kcal per gram) multiplied by the dry weight of the carcass (in grams). "Carcass energy per gram" is based on the carcass energy (in Kcal) as determined by bomb calorimetry of a homogeneous sample of the total dry carcass. All of these energy values are the average of a representative sample of rats (i.e., 10 rats).)

Brief Summary Text (63):
The reduced calorie fats useful in the fat component are further characterized by a particular fatty acid composition. One important aspect of this fatty acid composition is the total amount of medium chain C.sub.8 and C.sub.10 saturated fatty acids (i.e., caprylic and capric acids). These medium chain fatty acids generally control the melting point of the respective triglyceride mixture. In addition, these medium chain fatty acids are readily hydrolyzed (especially if attached at the #1 or #3 positions) by pancreatic lipase and then absorbed to provide a rapid energy source. However, these medium chain fatty acids, when metabolized, provide less total calories than longer chain fatty acids.

Brief Summary Text (68):
The reduced calorie fats can also contain minor amounts of other fatty acids. For example, small amounts of C.sub.12 to C.sub.18 saturated fatty acids (e.g., lauric, myristic, palmitic and stearic acids), as well as C.sub.18 unsaturated fatty acids (e.g., oleic, linoleic and linolenic acids), can be present in the reduced calorie fats, typically due to the sources of fatty acids used in synthesis. These fatty acids can affect the calorie reduction benefits, as well as the mouthmelt, firmness and tempering properties, of these reduced calorie fats. Accordingly, these reduced calorie fats usually comprise no more than about 9%, preferably no more than about 5%, and most preferably no more than about 3% of these other fatty acids.

Brief Summary Text (77):

Tribehenin, useful for making the present reduced calorie triglycerides, can be prepared from behenic acid or from fractionated methyl behenate by esterification of the acid, or by transesterification of methyl behenate with glycerol. More importantly, blends of behenic acid and medium chain C.sub.8 /C.sub.10 saturated fatty acids can be esterified with glycerol. Similarly, methyl ester blends can also be interesterified with glycerol.

Brief Summary Text (107):
Even when the cooled product is held at temperatures in the range of from about 30.degree. to about 55.degree. F. (from about -1.1.degree. to about 12.8.degree. C.), the formation of .beta.-3 crystals from the sub .alpha. phase of the reduced calorie fat can occur at a slow rate. Accordingly, the cooled product needs to be held in this cooler temperature range for a period of time sufficient to form an effective amount of .beta.-3 crystals. Generally, the longer the cooled product is held at these lower temperatures, the greater will be the formation of .beta.-3 crystals. Under some circumstances (e.g., minimal/no milkfat in product, inclusion of some .beta.-3 seed crystal material, tempering at close to 55.degree. F. (12.8.degree. C.), very gradual warming of cooled product after tempering) holding the cooled product for at least about 2 hours at these cooler temperatures can be adequate to generate an effective amount of .beta.-3 crystals. Usually, holding the cooled product at these lower temperatures for at least about 16 hours is sufficient to form an effective amount of .beta.-3 crystals under most circumstances. Preferably, the cooled product is held at these lower temperatures for at least about 40 hours (typically from about 44 to about 72 hours) to form even greater amounts of .beta.-3 crystals. This holding step can be carried out in a controlled temperature storage environment, e.g. a controlled temperature warehouse or refrigerated truck.

Brief Summary Text (110):
Because the tempering process of the present invention generates .beta.-3 crystals in situ in the reduced calorie fat, the inclusion of preformed .beta.-3 seed crystals in the chocolate-flavored formulation is not required. However, the inclusion of minor amounts (e.g., from about 5 to about 10%) of .beta.-3 seed crystal material in the fluid/liquid chocolate-flavored mass prior to tempering can be desirable. In particular, the inclusion of such .beta.-3 seed material can be helpful in decreasing the tempering time required at cooler (i.e., below 57.degree. F. (13.9.degree. C.)) and warmer (i.e., above 57.degree. F. (13.9.degree. C.)) temperatures. This .beta.-3 seed material can be obtained by subjecting a portion of the refined chocolate-flavored formulation to the tempering process of the present invention.

Detailed Description Text (4):
The reduced calorie fat used in this chocolate-flavored composition is prepared generally as follows: Compritol 888 (a mixture of approximately 25% monobehenin, 50% dibehenin and 25% tribehenin, sold by Gattefosse of 200 Sawmill River Road, Hawthorne, N.Y.) is further esterified at 265.degree. C. with capric fatty acid until the diglyceride concentration of the mixture is reduced to less than 4%. The weight ratio of Compritol 888 to capric fatty acid at the start of esterification is 70:30. The resulting esterified mixture is deodorized at 26.degree. C. for 3 hours and then combined with Captex 355 (a mixture of C.sub.8 /C.sub.10 medium chain triglycerides, sold by Capital City Products, of Columbus, Ohio) in a weight ratio of 58:42. This mixture is randomly rearranged (randomized) at a temperature of 80.degree. C. for 20 minutes using 0.06% sodium methoxide as the catalyst, neutralized with phosphoric acid and then filtered to remove sodium phosphate. The randomized mixture (approximately 2.5% diglycerides, 38.5 % medium chain (MMM) triglycerides, 43.5% mono-long chain (MLM/MML) triglycerides, 13.5% di-long chain (LLM/LML) triglycerides, and 1% tri-long chain (LLL) triglycerides), is steam stripped at a temperature of 450.degree. F. to 515.degree. F. (232.2.degree. to 268.3.degree. C.) during which a major portion of the medium chain triglycerides are distilled off. The stripped residue (2.5% diglycerides, 6% medium chain

triglycerides, 67% mono-long chain triglycerides, and 24% di-long chain triglycerides) is then passed three times at gradually increasing temperatures through two 14 inch molecular stills (connected in series) to increase the level of mono-long chain triglycerides. The molecular stills are operated under the following conditions:

Detailed Description Text (21):
The remaining reduced calorie fat (75.0 g.) and the lecithin are then added to the wet-conched mixture and mixed thoroughly. A portion of this chocolate-flavored coating mixture (.about.1000 g.) is heated to 120.degree. to 125.degree. F. (48.9.degree. to 51.7.degree. C.) and mixed at this temperature for about 60 minutes. The temperature is then reduced to about 85.degree. F. (29.4.degree. C.). Rectangular pieces of confectionary candy centers (caramel, peanuts and nougat) weighing about 8 or 12 g. each are dipped into this chocolate-flavored coating mixture to enrobe the centers. After draining the excess coating, the pieces are placed on trays and cooled to 50.degree. F. (10.degree. C.). After about 65 hours at 50.degree. F. (10.degree. C.), the enrobed candy products are gradually warmed to 60.degree. F. (15.6.degree. C.) and then held at this temperature for 17 days, followed by gradual warming to 70.degree. F. (21.1.degree. C.) and then holding at this temperature for 4 hours. The enrobed 8 g. centers are cut into two pieces, while the 12 g. centers are cut into three pieces, and then wrapped individually in foil for storage at 70.degree. F. (21.1.degree. C.).

CLAIMS:

21. The process of claim 2 which comprises the further step of including in the composition of step (1) from about 5 to about 10% .beta.-3 crystal seed material prior to step (II).

22. The process of claim 2 which is carried out without including .beta.-3 crystal seed material in the composition of step (I).

35. The process of claim 23 which comprises the further step of including in the composition of step (I) from about 5 to about 10% .beta.-3 crystal seed material prior to step (II).

36. The process of claim 23 which is carried out without including .beta.-3 crystal seed material in the composition of step (I).

First Hit Fwd Refs

L4: Entry 18 of 26 File: USPT Aug 25, 1992

DOCUMENT-IDENTIFIER: US 5142071 A
**** See image for Certificate of Correction ****
TITLE: Selective esterification of long chain fatty acid monoglycerides with medium chain fatty acids

Brief Summary Text (5):
This European patent application 322,027 described the synthesis of these reduced calorie fats by a wide variety of techniques. These techniques include: (a) random rearrangement of long chain triglycerides (e.g., tristearin or tribehnin) and medium chain triglycerides; (b) esterification of glycerol with a blend of the corresponding fatty acids; (c) transesterification of a blend of medium and long chain fatty acid methyl esters with glycerol; and (d) transesterification of long chain fatty acid glycerol esters (e.g., glyceryl behenate) with medium chain triglycerides. In particular, Example 1 of European patent application 322,027 discloses the synthesis of such reduced calorie fats by random rearrangement of tribehenin and commercial grade medium chain triglycerides using sodium methoxide as the catalyst at reaction temperatures of from 78.degree. to 91.degree. C. This catalyzed random rearrangement synthesis provides a complex mixture of MLM, MML, LML, LLM, MMM and LLL triglycerides, as well as the various mono- and diglycerides. (A similar, complex mixture of triglycerides is obtained when glycerol is esterified with a mixture of medium and long chain fatty acids, in the absence of an esterification catalyst, at temperatures of about 265.degree. C.) Of this complex mixture, the particularly desirable MML/MLM triglycerides comprise, at most, only about 40 to about 45% of the total triglycerides. This necessitates an extensive purification step by techniques such as molecular distillation, solvent fractional crystallization, winterization, or a combination of such techniques, to increase the level of desired MML/MLM triglycerides in the reduced calorie fat.

Brief Summary Text (14):
Tsuda et al, "Melting Points and Hardness of Saturated Triglycerides Containing Lower Fatty Acids", Osaka Furitsu Kogyo Shoreikan Hokoko, No. 25 (1961), pp. 44-48 (Chem. Abstracts 61:849h), discloses monostearins esterified with lower fatty acids such as acetic, propionic, isobutyric, isocaproic, caproic, caprylic, and capric acid. In these esterifications, 1, 1.2 or 2 moles of propionic, isobutyric, isocaproic, caproic, caprylic, or capric acid, were reacted with 1 mole of monostearin using stannous chloride as the catalyst, to obtain glycerides alleged to be useful as cocoa butter substitutes.

Brief Summary Text (16):
Feuge et al, "Preparation of Triglycerides by Controlled Esterification," J. Am. Oil Chem. Soc., Vol. 40 (1963), pp. 260-65, discloses the esterification of 1-monostearin with oleic acid (10% excess) at temperatures of 100.degree., 120.degree., 150.degree. and 200.degree. C., using p-toluenesulfonic acid as the catalyst. This reference suggests interesterification that occurs in some acid-catalyzed esterifications is caused by water formed during the reaction, and therefore recommends its continuous removal by stripping with vaporized hexane. This 1-monostearin esterification process is taught to be useful in making tailor-made fats such as cocoa butter-like fats. See also Gros et al, Preparation of Partial Glycerides by Direct Esterification," J. Am. Oil Chem. Soc., Vol. 41 (1964), pp. 727-31 (esterification of 1-monostearin with oleic, stearic or lauric acid in a 1:1 or 1:2 mole ratio at a reaction temperature of 80.degree. or

100.degree. C. using p-toluenesulfonic acid as the catalyst to obtain the respective diglycerides); U.S. Pat. No. 3,119,849 to Feuge et al, issued Jan. 28, 1964 (esterification of diglycerides of palmitic and/or stearic acid with oleic acid using p-toluenesulfonic acid as the catalyst with azeotropic distillation to remove generated water).

Brief Summary Text (22):
By "medium cain saturated fatty acid," as used herein, is meant C.sub.6 (caproic), C.sub.8 (caprylic, or C.sub.10 (capric) saturated fatty acids, or mixtures thereof. The C.sub.7 and C.sub.9 saturated fatty acids are not commonly found, but they are not excluded from the possible medium chain fatty acids. The present medium chain fatty acids do not include lauric acid (C.sub.12), sometimes referred to in the art as a medium chain fatty acid.

Brief Summary Text (31):
The medium chain (i.e., C.sub.6 -C.sub.10) fatty acids useful in the monoglyceride esterification process of the present invention can be derived from a number of different sources. For example, medium chain saturated fatty acids can be obtained from coconut, palm kernel or babassu oils. They can also be obtained from commercial medium chain triglycerides, such as the Captex 300 brands sold by Capital City Products of Columbus, Ohio. Typically, these sources of medium chain fatty acids are subjected to hydrolysis to provide a mixture of free fatty acids, followed by solventless fractionation to provide a fatty acid fraction enriched in the medium chain fatty acids. For example, refined, bleached, and deodorized coconut or palm kernel oil, which has been hydrogenated to further increase the level of saturated fatty acids, can be subjected to hydrolysis conditions, followed by solventless fractionation (i.e. distillation) to provide a fatty acid fraction enriched in a mixture of C.sub.8 and C.sub.10 saturated fatty acids that is typically processed to meet Food Chemical Codex criteria for caprylic (C.sub.8) and capric (C.sub.10) acids. It is also desirable that the sources of medium chain fatty acids have good thermal color stability, e.g., after heating at 205.degree. C. for 2 hours, a mixture of C.sub.8 and C.sub.10 saturated fatty acids has only a 5-10% optical transmission reduction when measured at 440/550 nanometers.

Brief Summary Text (37):
(c) Hydrolysis of a naturally occurring oil, preferably a completely or substantially completely hydrogenated naturally occurring oil (e.g., high erucic acid rapeseed oil or soybean oil hydrogenated to an Iodine Value (I.V.) of about 10 or less) by the use of a 1,3-specific lipase, followed by removal of the residual fatty acids, glycerol, diglycerides and triglycerides. See Holmberg, "Enzymatic Preparation of Monoglycerides in Microemulsion," J. Am. Oil Chem. Soc., Vol. 65 (1988), pp. 1544-48, which is incorporated by reference.

Brief Summary Text (40):
The long chain fatty acids per se or naturally occurring fats and oils can serve as sources of the long chain fatty acids. For example, soybean oil and high erucic acid rapeseed oil hydrogenated to an I.V. of about 10 or less are good sources of stearic and behenic fatty acids, respectively. Odd chain length long chain fatty acids can be derived from certain marine oils. Alternatively, mixed chain length fatty acid monoglycerides can be fractionated to provide a source of long chain fatty acids. For example, hydrogenated high erucic acid rapeseed oil can be transesterified with glycerol to provide a mixture of long chain fatty acid monoglycerides which can be subsequently fractionated by liquid/liquid extraction or adsorptive separation to yield a monobehenin-enriched mixture. The source of long chain fatty acids usually needs to be of sufficiently high purity in order to provide monoglycerides suitable for the esterification process of the present invention. Usually, the source of long chain fatty acids is at least about 90% pure in long chain fatty acids, and is preferably at least about 95% pure in such fatty acids. Preferably, the purity is in the range of from about 90 to about 98% long chain fatty acids.

Brief Summary Text (50):
The esterification process of the present invention can be carried out as either a batch or continuous reaction system. For example, mixed flow configuration can be used to continuously react the medium chain fatty acids with the monoglycerides in one or more reaction stages. It is preferred that the reaction system(s) be equipped with partial condensors to allow continuous reflux of the medium chain fatty acids while generated water is being removed. Alternatively, thin film-type reaction systems operated under vacuum at high temperatures with short residence times can be used in this esterification step. Typically, the solid or liquid monoglycerides are added to the melted medium chain fatty acids at the desired esterification temperature to permit more effective removal of generated water and to minimize disproportionation of the monoglycerides to diglycerides/glycerol, as well as the reaction of monoglycerides with medium and long chain (ML) diglycerides. The monoglycerides are also preferably added slowly to the melted fatty acids at a controlled rate of addition during esterification to minimize the concentration of unreacted monoglycerides in the mixture (e.g., to about 0.2% or less), and thus minimize the formation of MLL/LML triglycerides.

Brief Summary Text (61):
In addition to their uses in baked goods, the reduced calorie fats can be used along or in combination with other regular calorie fats and oils to make shortening and oil products. Suitable sources of regular fats and oils include, but are not limited to: 1) vegetable fats and oils such as soybean, corn, sunflower, rapeseed, low erucic acid rapeseed, canola, cottonseed, olive, safflower, and sesame seed; 2) meat fats such as tallow or lard; 3) marine oils; 4) nut fats and oils such as coconut, palm, palm kernel, or peanut; 5) milkfat; 6) cocoa butter and cocoa butter substitutes such as shea, or illipe butter; and 7) synthetic fats. Shortening and oil products include, but are not limited to, shortenings, margarines, spreads, butter blends, lards, salad oils, popcorn oils, salad dressings, mayonnaise, and other edible oils.

Brief Summary Text (92):
a. from about 10 to about 65% of an edible, substantially nonabsorbable, substantially nondigestable polyol fatty acid polyester having at least 4 fatty acid ester groups, wherein the polyol is selected from sugars and sugar alcohols containing from 4 to 8 hydroxy groups and wherein each fatty acid group has from 2 to 24 carbon atoms; and

Brief Summary Text (97):
Similarly, food and beverage compositions can be made that combine the present reduced calorie fats with dietary fibers to achieve the combined benefits of each. By "dietary fiber" is meant complex carbohydrates resistant to digestion by mammalian enzymes, such as the carbohydrates found in plant cell walls and seaweed, and those produced by microbial fermentation. Examples of these complex carbohydrates are brans, celluloses, hemicelluloses, pectins, gums and mucilages, seaweed extract, and biosynthetic gums. Sources of the cellulosic fiber include vegetables, fruits, seeds, cereals, and man-made fibers (for example, by bacterial synthesis). Commercial fibers such as purified plant cellulose, or cellulose flour, can also be used. Naturally occurring fibers include fiber from whole citrus peel, citrus albedo, sugar beets, citrus pulp and vesicle solids, applies, apricots, and watermelon rinds.

Brief Summary Text (164):
fatty acid standard: capric or caprylic acid or behenic acid

Brief Summary Text (182):
A reference standard, lauric acid (4.5 g.) dissolved in white mineral oil (1335 g.), is run with each group of samples. The results are compared with the known value for the reference standard to determine the accuracy of the sample results.

Brief Summary Text (184):
1. Weigh approximately 50 g. of sample into a 250 ml. Erlenmeyer flask to the nearest 0.01 g. Weigh a 15 g. sample of the lauric acid reference standard.